KLASIFIKASI PENYAKIT DAUN PADI BERBASIS CITRA DIGITAL MENGGUNAKAN TRANSFER LEARNING DENGAN MEMBANDINGKAN MODEL DEEP LEARNING EFFICIENTNET-B0 DAN EFFICIENTNET-B1

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ABSTRACT

Rice leaf diseases pose a serious threat to agricultural productivity in Indonesia. Manual identification is limited by overlapping symptoms among disease types, the need for specialized expertise, and the risk of misdiagnosis. This study aims to develop a digital image-based rice leaf disease classification system using deep learning with EfficientNet-B0 and EfficientNet-B1 architectures, incorporating transfer learning. The dataset consists of 6,932 rice leaf images across five classes: Bacterial Blight, *Blast*, Brown Spot, Tungro, and Healthy, split at a 70:15:15 ratio for training, validation, and testing. Preprocessing steps included resizing images to 224×224 pixels (B0) and 240×240 pixels (B1), pixel normalization, and data augmentation through rotation, *horizontal flip*, *zoom*, and brightness adjustment. Training was conducted in two phases *freezing* and fine-tuning using the Adam optimizer with a learning rate of 1×10^{-4}, complemented by *model checkpoint*, EarlyStopping, and ReduceLROnPlateau mechanisms. Three augmentation scenarios were evaluated: no augmentation (Scenario 1), partial augmentation of the Healthy class to 1,300 images (Scenario 2), and full augmentation of all classes to 1,600 images (Scenario 3). In the baseline evaluation (Scenario 1), EfficientNet-B0 achieved an accuracy of 99.52% and EfficientNet-B1 achieved 99.90%. The best performance for EfficientNet-B0 was obtained in Scenario 3 with an accuracy of 99.75%, while EfficientNet-B1 achieved a perfect accuracy of 100.00% in Scenario 2. EfficientNet-B1 outperformed EfficientNet-B0 across all scenarios and evaluation metrics, making it the superior choice for accuracy-critical applications. EfficientNet-B0 remains a competitive alternative for deployment on resource-constrained devices.

Kata kunci : rice leaf disease, image classification, deep learning, EfficientNet-B1, transfer learning